UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
2004/00669

July 2, 2004

Mr. Lawrence Evans
U.S. Army Corps of Engineers, Portland District
ATTN: Teena Monical
P.O. Box 2946
Portland, Oregon 97208-2946

Re: Reinitiation of Endangered Species Act Section 7 Consultation and Magnuson-Stevens Act Essential Fish Habitat Consultation on the Effects of the I-5 McKenzie River Bridges Northbound Detour and Northbound (Temporary Repair) & Willamette River Bridge (Detour) Sections Project, Willamette River and McKenzie Rivers, Lane County, Oregon (Corps Nos. 200300297 and 200300338)

Dear Mr. Evans:

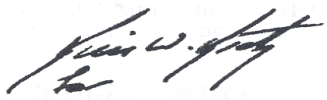
Enclosed is a revised biological opinion (Opinion) prepared by NOAA's National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) resulting from reinitiation of consultation on the I-5 McKenzie River Bridges Northbound Detour and Northbound (Temporary Repair) & Willamette River Bridge (Detour) Sections Project, Willamette River and McKenzie Rivers, Lane County, Oregon (Corps Nos. 200300297 and 200300338). The project area includes I-5 at the crossings of the Willamette River at river kilometer (RKm) 296 and the McKenzie River at RKm 11. The project area lies in the City of Eugene, Lane County, Oregon. The Army Corps of Engineers (COE) is permitting the construction of the proposed project.

In this Opinion, NOAA Fisheries concludes that funding the proposed action is not likely to jeopardize the continued existence of ESA-listed Upper Willamette River (UWR) Chinook (*Oncorhynchus tshawytscha*). As required by section 7 of the ESA, NOAA Fisheries includes reasonable and prudent measures with nondiscretionary terms and conditions that NOAA Fisheries believes are necessary to minimize the impact of incidental take associated with this action.

This document also serves as consultation on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act and its implementing regulations (50 CFR Part 600). These sections of the Willamette River and McKenzie River basins are designated as EFH for coho (*O. kisutch*) and Chinook salmon.

If you have any questions regarding this letter, please contact Tom Loynes at 503.231.6892 of my staff in the Oregon State Habitat Office.

Sincerely,



D. Robert Lohn
Regional Administrator

cc: Frannie Brindle, ODOT
Nick Testa, ODOT
Brian Bauman, ODOT
Heather Catron, ODOT
Randy Reeve, ODFW
Jon Adkins, Mason, Bruce and Girard, Inc.

Endangered Species Act - Section 7 Consultation
Biological Opinion

&

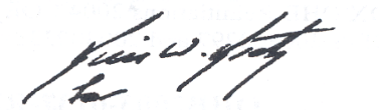
Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Reinitiation of Consultation of the I-5: McKenzie River Bridge Northbound Detour and Northbound (Temporary Repair) and Willamette River Bridge (Detour) Sections Project, Willamette and McKenzie Rivers, Lane County, Oregon
(Corps Nos. 200300297 and 200300338)

Agency: U.S. Army Corps of Engineers

Consultation Conducted By: NOAA's National Marine Fisheries Service, Northwest Region

Date Issued: July 2, 2004



Issued by: _____
D. Robert Lohn
Regional Administrator

Refer to: **2004/00669**

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1. INTRODUCTION

1.1 Background and Consultation History

On June 9, 2003, NOAA's National Marine Fisheries Service (NOAA Fisheries) received a request from the Corps of Engineers (COE) for Endangered Species Act (ESA) section 7 formal consultation and essential fish habitat (EFH) consultation under the Magnuson-Stevens Fishery Management and Conservation Act (MSA) for the I-5: McKenzie River Bridges Northbound Detour and Northbound (Temporary Repair) & Willamette River Bridge (Detour) Sections Project, Lane County, Oregon. In the accompanying biological assessment (BA), the COE determined that Upper Willamette River (UWR) Chinook (*Oncorhynchus tshawytscha*) are likely to be adversely affected (LAA) by the proposed project.

A biological opinion (Opinion) was signed on August 20, 2003, (NOAA Fisheries No.: 2003/00728) and was based on the information presented in the BA, site visits, and discussions with, COE, ODOT, and project consulting firm Mason, Bruce and Girard, and considered the potential effects of the proposed action on UWR Chinook. UWR Chinook were listed as threatened on March 24, 1999 (64 FR 14308) and protective regulations issued on July 10, 2000 (65 FR 42422). Additional references and biological information are available in Myers *et al.*1998 and Healey 1991. The consultation was conducted pursuant to section 7(a)(2) of the ESA and its implementing regulations, 50 CFR 402 and for MSA section 305 (b)

On May 21, 2004, NOAA Fisheries staff participated on a site visit with staff from ODOT and the contractor. All of the participants on the site visit agreed that the effects of the project were beyond those proposed in the original action and that incidental take would occur that was not authorized in the August 20, 2003 Opinion. On June 14, 2004, NOAA Fisheries received a letter from the COE indicating that the proposed action has changed and it was not possible to complete the project as originally proposed, and requesting reinitiation.

NOAA Fisheries prepared this Opinion to address impacts to these species as a result of the modified proposed action, based on the revisions to the project detailed in the June 14, 2004 letter from the COE and accompanying information. The objective of this Opinion is to determine whether the actions included in the proposed project are likely to jeopardize the continued existence of the above-listed species.

1.2 Proposed Actions

Proposed actions are defined in NOAA Fisheries' regulations (50 CFR 402.02) as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas."

1.2.1 Original Proposed Action

The purpose of the proposed project is to maintain safe, efficient inter- and intrastate trade in the I-5 corridor by constructing heavy-duty, temporary detour bridges to carry I-5 across the Willamette and the McKenzie Rivers at the City of Eugene. The temporary detour bridges are required to eliminate the current 322-kilometer (km) detour for heavy haul (over 47,854 kilograms or greater than legal axle weight) truck traffic caused by overloading of the existing bridges beyond applicable weight restrictions. Work must start in July 2003 to place temporary work bridges and foundations for the temporary detour bridges in the rivers within the time periods that will minimize impacts to ESA-listed fish.

The project area includes I-5 at the crossings of the Willamette River at river kilometer (RKm) 296 and the McKenzie River at RKm 11. The project area lies in the City of Eugene, in Lane County, Oregon.

The project action area encompasses two locations. One surrounds the Willamette River and Patterson Slough bridges, their approaches, and the Franklin Boulevard off-ramp. The second area encompasses the McKenzie River Bridge and its approaches. All three crossings include waterways and surrounding lands that will be affected by, or directly involved in, project construction, staging or transport, and storage of materials and equipment.

The action area for the Willamette River and Patterson Slough crossings include both waterways where they will be occupied by proposed work bridges and/or detour structures. This area extends downstream from the structures a distance of approximately 150 meters (m). Additional waterways in this part of the project include two branches of an unnamed tributary entering the Willamette River from the south in the vicinity of the Franklin Boulevard off-ramp. The McKenzie River Bridge portion of the action area extends from where it will be crossed by the proposed work bridge and detour structure to a distance of approximately 150 m downstream.

1.2.1.1 Temporary Work Bridges

Temporary work bridges will be constructed at both the Willamette River and McKenzie River Bridge crossings. The bridges will be used as work platforms for construction of in-water bents and placement of deck girders for the detour bridges. A single contractor will construct both bridge projects under a single construction contract. Therefore, it is assumed that both work bridge structures will be of a similar design and will be built using similar materials, construction methods, and equipment, differing in only a few respects such as overall size and foundation. If the assumed design is not similar and has impacts beyond those described in the proposed action and effects beyond those analyzed in the Opinion, this consultation must be reinitiated.

The final configuration of temporary work bridges will be determined by the construction contractor. It is likely that the work bridges will be pile-trestle structures, typical of temporary structures constructed as work platforms. The work bridges will generally consist of longitudinal platforms extending parallel to proposed detour bridge alignments and transverse

"fingers" which extend parallel to proposed detour bridge bents. The longitudinal sections will be used for hauling out excavated material and other general activities required for construction of the detour bridge, including setting crossbeams, girders, and decking. The fingers will be used primarily as work platforms for construction of the drilled shafts.

ODOT has placed constraints on work bridge design and overall configuration to ensure the required level of function and to minimize impacts to the Willamette and McKenzie Rivers. It is specified in project plans that temporary work bridge spans must be at least 9 m in length to minimize the number of bents in the water. Another requirement is that temporary work bridges be designed and constructed to withstand a 2-year flood, to allow for the possibility that the work bridges will be in the water during higher flows. Work bridge decks must be designed for full containment in case of spills or leaks. It is expected that decking will be lined with plastic sheeting and curbed and constructed of plywood or timber beams. The work bridges will be supported on steel pipe or timber piles either driven or vibrated several meters into the streambed until they come to rest on the underlying bedrock layer (McKenzie River) or rest directly on the streambed surface where bedrock footing is exposed (Willamette River).

Construction of the temporary work bridges will be completed using a leap-frog approach. Starting from one side of the river, piles will be driven or set on a temporary footing for the end bent. The piles will be driven for the next bent and the deck will be set on the piles using a crane. The crane will then be moved out onto the newly-constructed span and the procedure will be repeated for subsequent bents and deck spans until the channel is completely spanned.

Willamette River Temporary Work Bridge.
The proposed Willamette River temporary work bridge will be constructed to provide access to bents 3 through 10 of the proposed detour bridge. It will consist of two parallel platforms running longitudinally along both sides of the proposed detour structure between bents 3 and 10 and will have transverse "fingers" running parallel to the proposed detour bridge bents. The work bridge will be supported on up to 236 steel pipe or timber piles placed either on concrete footings constructed on the predominately bedrock streambed or driven slightly into the bedrock just enough to provide uniform bearing and prevent slipping. The proposed temporary work bridge will remain in place over the winter of 2003 to 2004, and will be removed during the summer of 2004.

It is possible that the presence of a predominately bedrock substrate at the Willamette River Bridge will prevent pile driving. In this case temporary work bridge pilings will rest on concrete footings constructed on the exposed bedrock. Footings would likely be constructed individually for each pile and would be approximately 0.6 m by 0.6 by m by 0.3 m in size. Construction of concrete footings in the channel will require work area isolation and dewatering. Work isolation areas will likely be established around individual piles or groups of pile locations using cofferdams consisting of sand-filled or water-filled bladders, or other similar barriers. Due to the predominantly bedrock substrate, it will not be possible to drive sheet pile. Work area isolation may also involve fish salvage. Work area isolation enclosures around individual pilings would

be very small and unlikely to contain listed fish. Therefore, the need for fish salvage operations will be assessed by an ODOT or ODFW biologist during construction.

McKenzie River Temporary Work Bridge.
The proposed McKenzie River temporary work bridge will be constructed to provide shaft drilling, equipment, and materials access to bents 4 through 6 of the proposed detour bridge. The bridge will consist of a single platform running longitudinally along the west side of the proposed detour structure and will have transverse "fingers" running parallel to the proposed detour bridge bents. The work bridge will be supported on approximately 40 steel pipe or timber piles driven into the cobble/gravel streambed. Another 26 piles will be driven into the high flow channel on the south side of the river.

In-water work required for construction of the temporary work bridge will include primarily pile driving and removal. Due to the expectation that very little turbidity will result from this activity, no containment or work area isolation is proposed for pile removal. All pile-driving activities in the McKenzie River portion of the action area will occur during the preferred in-water work period, July 1 to August 31.

1.2.1.2 Detour Bridges

Proposed detour bridges will be constructed at three locations including the Willamette River, Patterson Slough, and McKenzie River crossings of I-5. Detour bridges will carry passenger vehicle traffic and heavy haul truck traffic during replacement of the existing structures.

Proposed detour structures will consist of a combination of pre-cast, pre-stressed concrete box beam, concrete girder, and steel girder superstructures supported on concrete drilled shaft foundations. Bents within the regulated work area will be supported on either two (McKenzie River) or three (Willamette River) drilled shafts per bent. Drilled shafts will extend several meters into the bedrock which is either exposed at the streambed (Willamette River) or underlying several meters of river rock (McKenzie River). End bents and some interior bents outside the regulated work area will be supported on pipe pile foundations. In general, detour bridge spans over water will be 35 m long, but may vary at roadway, railroad, or utility crossings.

Drilled shafts within the OHW will utilize a double casing containment system to prevent drilling spoils from entering flowing water. The outer casing will consist of 3-m diameter steel construction casings equipped with teeth as required to allow the construction casing to advance a minimum of 30 cm into the bedrock substrate. In the McKenzie River, outer casings will be buried as required to provide stability and containment. Rock and soil within the outer casing will be excavated to a minimum depth of 750 millimeter (mm). The inner casing will consist of a 2-m diameter corrugated metal pipe (CMP) to be used as a stay-in-place form. Either concrete (Willamette) or river-run rock (McKenzie) will be placed between the inner and outer casings to hold the inner casing in place and, in the case of the Willamette Detour Bridge, form a seal from which sediment and turbid water cannot escape. Any spoils from the drilling will be hauled

away for off-site disposal. Outer casings within the regulated work area will be installed during the in-water work period approved for the project, and will function as full containment systems.

Rock will be excavated to the full depth of the shafts (between 4 and 7 m). Steel re-bar and concrete will fill the shafts to the top of the stay-in-place form. After concrete curing, the construction casing will be removed and the shaft will be complete. Each drilled shaft will require approximately 2 to 3 days to complete. ODOT anticipates that up to two shaft drilling rigs will be in operation simultaneously at the Willamette and McKenzie River bridges. Detour bridge decks will consist predominantly of precast prestressed concrete box beams.

Willamette River Detour Bridge

The Willamette River Detour Bridge will be in place for 6 to 10 years to allow time for public involvement, project design, and construction of the permanent replacement structures. The detour bridge will be constructed on the east side (upstream) of the existing bridge and will consist of 17 spans and 18 bents. Bents 1 and 2 include the north abutment and first mid-span bent on the northern riverbank above the OHW. Bents 3 through 8 will be constructed below the OHW of the Willamette River. A total of 18 drilled shafts will be constructed below the OHW of the Willamette River. Bents 9 and 10 will rest in riparian uplands on the south bank of the Willamette River. Bents 11 and 12 will set in upland areas surrounding Franklin Blvd and the multi-use path north of the Willamette River. Bents 13 through 17 will occur in proximity to the unnamed tributary and associated wetlands south of the Willamette River. Approximately two drilled shafts will be constructed within creek channels. Bent 18 is the southernmost bent (abutment) and will be constructed entirely on upland ground, outside of any wetlands, waters, or riparian areas. Some vegetation removal and wetland fill impacts will result from construction and placement of detour bridge bents.

Access to bents in proximity to the unnamed tributary (Bents 13-15) will require construction of temporary stream crossings and access roads, including placement of temporary fill materials within the wetland and riparian areas in proximity of the creeks to allow drilling equipment and general construction access to the bent locations. The wetlands in this area will be shown on plan sheets as restricted access areas. The contractor will be required to fully span active flowing waters and construct temporary access roads using clean aggregate over geotextile where construction access is needed in the restricted access areas. The temporary access roads and stream crossings will be in place for approximately nine months to allow completion of construction activities in this area. Following removal of the temporary creek crossings, streambanks will be restored to original grades, stabilized, seeded, and planted with native tree species and staked with native shrub species.

The Willamette River detour bridge will carry four lanes of traffic, two northbound (NB) lanes and two southbound (SB) lanes, detoured from the existing I-5 bridge. New impervious surface created through construction of the detour bridge and new approach alignments will total 1.8 hectares (ha). Stormwater generated from the Willamette River detour bridge will be conveyed to water quality facilities constructed for the project via gutters hung on the outside of the bridge. This will keep the stormwater from flowing directly into the Willamette River.

Stormwater runoff from the Willamette River detour bridge and associated roadways at both the north and south ends of the bridge will be treated by directing runoff to rock pads for energy dissipation, then to vegetated areas that will allow infiltration for removal of sediment and pollutants. Soils along the Willamette River in the action area are somewhat diverse, but are predominantly very well-drained, with rapid to moderately rapid permeability. The exception will be a water quality manhole that will be constructed to collect stormwater from the Franklin Boulevard off-ramp and trap suspended solids, oil, and grease. There is insufficient area for infiltration due to topography and proximity to the unnamed tributary. All feasible means will be undertaken to prevent discharge of stormwater runoff directly to the Willamette River, the unnamed tributary, or nearby wetlands.

McKenzie River Detour Bridge

The McKenzie River Detour Bridge will be constructed between the existing NB and SB structures and will consist of 8 spans and 9 bents. Bents 1 through 3 will make up the north abutment and first two mid-span bents, all of which are on the northern McKenzie River bank, above the OHW. Bents 4 and 5 will be constructed within the OHW of the McKenzie River for a total of four drilled shafts in the main river channel, below the OHW. Outer casings for drilled shafts below the OHW will be set in place during the preferred in-water work period, however, shaft drilling, rebar placement, concrete pouring, and other activities as required to construct the bents, with full containment, may occur outside the in-water work period. Bent 6 will be in a side channel south of the main river channel, but outside the OHW elevation. Bents 7, 8 and 9 make up the two southernmost mid-span bents and south bridge abutment. All three bents are entirely in an upland area within Armitage County Park, an area owned by ODOT but approved for recreational use. The detour bridge will be in place for 2 to 3 years to allow time for public involvement, project design, and construction of the permanent replacement structures.

The McKenzie River detour bridge will carry two NB lanes of traffic detoured from the existing NB I-5 bridge. New impervious surface created through construction of the detour bridge and new bridge approaches will total 1.7 ha. Stormwater generated from the McKenzie River detour bridge will be conveyed to vegetated ground via gutters hung on the outside of the bridge. This will keep the stormwater from flowing directly into the McKenzie River.

All feasible means will be undertaken to prevent discharge of stormwater runoff directly to the McKenzie River or nearby wetlands. At the north end of the bridge, vegetated ditches will be constructed on the east side of the NB lanes and on the west side of the SB lanes to accept runoff from the project area. Ditches will be constructed at least 1.2 m wide, 30 m long and with a slope of 0.5 to 0.75% for more efficient infiltration.

Runoff from the south end of the bridge will be directed to rock pads constructed of Class 50 riprap for energy dissipation, then will be directed as sheet flow to vegetated ground to allow infiltration. Runoff will pass over or through approximately 120 m of vegetated ground before entry to the high flow channel and wetlands on the south side of the McKenzie River.

Patterson Slough Detour Bridge

The Patterson Slough Detour Bridge will be constructed a few meters east of the existing NB I-5 bridge and will consist of three spans and four bents. Bents 1 and 4 will make up the north and south abutments and will be entirely outside the OHW of the slough. Each abutment will consist of steel pipe piles driven into the ground. Bents 2 and 3 will each consist of three drilled shafts, all above the OWH. Therefore, no in-water work will be required for construction of the detour bridge.

The Patterson Slough detour bridge will carry four lanes of traffic, two NB lanes and two SB lanes, detoured from the existing I-5 bridge. New impervious surface created through construction of the detour bridge and new approaches will total 0.7 ha. Stormwater generated from the Patterson Slough detour bridge will be conveyed off the bridge ends to vegetated ground for infiltration into local, moderately to highly permeable soils.

1.2.1.3 McKenzie River NB Bridge Temporary Repairs

The existing NB McKenzie River Bridge will be temporarily repaired to allow continued service until it is replaced. Temporary repairs will consist of placing steel stirrups along the length of all bridge girders and box beams. Girders over land (spans 1-4 and 8-11) will have external steel stirrups placed around each of the concrete girders. This will require drilling through the bridge deck and extending the stirrups through the deck and along side the girders, to then have steel angle iron bolted across the bottom of the girders. This work will occur over land, thus will not impact the McKenzie River. Bridge repair work will occur from the ground beneath the bridge; however, the areas under the bridge ends are rip-rapped and essentially devoid of vegetation.

Bridge spans 5 through 7 consist of concrete box beam girders. Temporary repairs to these spans will require only partial drilling through the girders from the top for insertion of epoxied steel rods. No drilling will occur on the underside of the bridge deck directly over water, thus containment of drilling dust and debris will occur on the bridge deck, itself.

Additional repairs to the McKenzie River NB Bridge will include placement of temporary bent supports under bents 2 through 7, all of which are outside the OHW elevation. Two temporary supports, consisting of steel H-pile, will be placed under each bent. This will require excavation of approximately 30 m^3 of material (5 m^3 of material from each bent location) from under the 6 bents. Concrete footings will be poured to form foundations for the temporary supports. Some of the excavated material will be replaced as backfill, and the rest will be hauled away for disposal.

The existing NB bridge will be further strengthened through crack injection with epoxy. The crack injection process requires preparation of the concrete surface with a wire brush to clean the surface, potentially generating dust and debris. Following surface preparation, epoxy paste is injected into cracks in the bridge girders. Some of this activity will occur over the regulated work area, potentially contributing dust, debris, and uncured epoxy to flowing water. However, this work will be conducted from the bridge deck using a snooper crane or similar equipment

equipped with a solid work platform to provide containment of debris and contaminants generated through the crack injection process. When dry, the epoxy is completely inert, thus would not cause any chemical contamination within the regulated work area. Normally, epoxy filler would be ground smooth after it has cured; however, for the proposed project, epoxy will be left in a rough condition to avoid the need for grinding, eliminating impacts associated with input of epoxy dust and debris to McKenzie River.

1.2.1.4 Stormwater Treatment

New impervious surface created through construction of the Willamette River detour bridge and new approach alignments will total 1.8 ha. Stormwater generated from the Willamette River detour bridge will be conveyed to water quality facilities constructed for the project via gutters hung on the outside of the bridge. Stormwater runoff at both the north and south ends of the bridge will be treated by directing runoff to rock pads for energy dissipation, then to vegetated areas that will allow infiltration. Soils along the Willamette River in the action area are predominantly well-drained and permeable. There will be a water quality manhole constructed to collect stormwater from the Franklin Boulevard off-ramp and to trap suspended solids, oil, and grease due to the insufficient area for infiltration because of the area's topography and proximity to the unnamed tributary.

New impervious surface created through construction of the McKenzie River detour bridge and new bridge approaches will total 1.7 ha. Stormwater generated will be conveyed to vegetated ground via gutters hung on the outside of the bridge. At the north end of the bridge, vegetated ditches will be constructed on the east side of the NB lanes and on the west side of the SB lanes to take runoff from the project area. The vegetated ditches will be constructed to promote infiltration and be at least 1.2 m wide, 30 m long and with a slope of 0.5 to 0.75%. On the south end of the bridge runoff will be directed to rock pads for energy dissipation (constructed of Class 50 riprap), then directed across 120 m of vegetated ground to allow infiltration before entry to the high flow channel and wetlands on the south side of the McKenzie River.

New impervious surface created through construction of the Patterson Slough detour bridge and new approaches will total 0.7 ha. Stormwater generated from the Patterson Slough detour bridge will be conveyed off the bridge ends to vegetated ground for infiltration into local, moderately to highly permeable soils.

1.2.1.5 Franklin Boulevard Off-ramp Realignment and Culvert Construction

Construction of the detour bridge over the Willamette River to the east of the existing NB bridge will require shifting the alignment of the Franklin Boulevard off-ramp to the east approximately 3 to 4 m along most of its length. This work will be among the first of the project's construction activities. The off-ramp must be realigned before the south end of the proposed detour bridge can be constructed. A branch of the unnamed tributary runs parallel to the off-ramp along the

toe of slope. Shifting the off-ramp alignment will require that the creek be placed within a culvert for a distance of approximately 131 m.

The Franklin Boulevard off-ramp culvert will be an arched pipe, approximately 3 m wide and 2.1 m deep. The culvert will be countersunk approximately 0.45 m and partially filled with Class 25 streambed materials. Larger boulders will be added to provide hydraulic shadows as resting areas for fish. In addition, 50-millimeter (mm) river-run rock with fine sediment will be included to fill interstitial spaces between the larger materials. The culvert will be beveled and will have concrete headwalls at both the inlet and outlet. The proposed culvert will be in place during the life of the project, a period of 6 to 10 years, after which it will be removed and the stream channel restored as part of the future bridge replacement project. The culvert's slope will match the existing stream channel gradient of approximately 0.8% and has been designed to meet ODFW fish passage criteria (ODFW 2003). Culvert construction and all associated in-water work will occur during the in-water work period of June 1 to October 31.

Placement of the Franklin Boulevard off-ramp culvert will require vegetation clearing, grading, and excavation within the stream channel, approximately 0.45 m below the elevation of the culvert invert to place granular Class C backfill material under the culvert. There is water in the creek channel throughout the year, therefore a work area isolation and stream diversion plan will be developed to divert flow around the work area and back to the channel downstream from the culvert. At no time, will flow downstream from the work area be completely disrupted. Upstream and downstream fish passage will be impeded for up to seven days during culvert construction.

1.2.1.6 Judkins Road and Culvert Removal

Judkins Road joins Franklin Boulevard from the east and crosses the unnamed tributary. The creek passes under Judkins Road through a 2 m by 2 m reinforced concrete box culvert (RCBC) approximately 20 m in length. This road is used only as an exit route from Judkins Road to Franklin Boulevard, and will be removed as part of the proposed project. There is water in the creek channel throughout the year, therefore a work area isolation and stream diversion plan will be developed to divert flow around the work area and back to the channel downstream from the culvert. At no time, will flow downstream from the work area be completely disrupted. Fish passage will be disrupted for approximately 2 days during culvert removal and channel reconstruction.

The newly-exposed stream channel will be graded to match existing grades up and downstream, and will be covered with Class 25 riprap to provide a stable streambed. Two to three 50 kg to 90 kg rocks will be placed in the new streambed every 10 m of channel length as shown in the plans. Loose riprap will be mixed with river-run rock (maximum 50 mm diameter) together during placement at a ratio of four parts riprap to one part river-run material. Silt and or clay fines may be added to the granular material if it does not have fines to seal properly. After the material is mixed together, placed and bucket compacted, high-pressure water will be used to force the fines into the voids until the water pools at the surface. Following stream channel

work, side slopes will be re-graded to a more natural contour, stabilized, seeded and planted with native tree and shrub species.

1.2.1.7 Work Area Isolation and Fish Salvage

Before initiating construction activities within the wetted channel, proposed work areas will be isolated and dewatered. Accomplishing the proposed work in dry conditions will reduce potential impacts to downstream water quality and minimize direct harm to fish. Work area isolation, dewatering, and fish salvage and handling activities will be monitored by trained and experienced biologist(s). All work area isolation activities including fish salvage, dewatering, pumping and release of discharge water, and reintroduction of flows will be conducted during the in-water work period approved for this project.

In-water work areas will be well isolated from the active flowing stream using the measures described in sections 3.4, 3.5, 3.7, 3.8, and 7.2 of the BA. Before and intermittently during pumping to isolate an in-water work area, an attempt will be made to capture and release fish from the isolated area using trapping, seining, electrofishing, or other methods as are prudent to minimize risk of injury to fish. A fishery biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish will conduct or supervise the entire fish capture and release operation. If electrofishing equipment is used to capture fish, the capture team will comply with NOAA Fisheries electrofishing guidelines ESA-listed fish will not be transferred to anyone except NOAA Fisheries personnel, unless otherwise approved in writing by NOAA Fisheries.

Other Federal, state, and local permits necessary to conduct the capture and release activity will be obtained. NOAA Fisheries (or its designated representative) will be allowed to accompany the capture team during the capture and release activity, and may inspect the team's capture and release records and facilities.

1.2.1.8 Site Restoration

All streambanks, soils, and vegetation disturbed by the project will be cleaned up and restored. The restored streambanks will be reshaped to a more natural slope, pattern, and profile; and disturbed areas will be seeded and mulched with a permanent erosion control mix designed to promote shade-producing vegetation. An appropriate mix would consist of red fescue (*Festuca rubra*) (40%), blue wild rye (*Elymus glaucus*) (40%), and red alder (*Alnus rubra*) (20% by weight), and native blue wild rye staw mulch, applied at a rate of 22.5 kg/ha. This seed mix has been shown to provide shade-producing riparian vegetation within a period of 4 to 6 years (N. Testa pers. comm. May 2, 2003). No pesticide application will be allowed and no fertilizer will be applied within 15 m of the regulated work areas.

The temporary work bridges and all of the pilings associated with them will be removed outside of the in-water work period, but during a time of year when turbidity is high. The pilings will be vibrated out of the substrate or detached from the bedrock.

The Judkins Road Culvert will be removed and the streambed and banks will be restored to a more natural condition.

Monitoring will be conducted for a 5-year period to document the success of riparian seeding and restoration efforts. If necessary, failed planting and seeding areas will be replanted or reseeded to achieve stabilization at the end of the first year, and 80% survival or 80% coverage after 5 years (including both seeding and natural recruitment). Corrective activities will require entry by maintenance crews and equipment into the regulated work area and adjacent wetland and riparian areas. Possible corrective actions may include replacement plantings and reseeding along the banks and within the riparian area.

1.2.2 Modified Proposed Action

The modifications to the proposed action involve only the McKenzie River workbridge installation and the associated fish salvage.

Due to the unanticipated amount of riprap in the area where bent 4 (drilled shaft) of the detour bridge will be installed, in-water excavation of this riprap will be needed to allow construction of bent 4 and installation of the work bridge pilings. The area of riprap excavation will be isolated to prevent migration of suspended sediment and turbidity. Fish removal will take place within the isolated area before in-water work minimizing impacts to ESA-listed UWR Chinook. This additional in-water work was not consulted on in the original Opinion.

The excavation will be isolated from the rest of the river. Sand bags and a sediment curtain, or an equivalent approved by NOAA Fisheries, will be used to prevent sediment migration out of the isolated area and prevent fish from entering the in-water work area. Before riprap excavation and bent installation, fish will be removed from the isolated area. In-water work area isolation will be installed and removed, and all riprap excavation and replacement will occur during the recommended in-water work window of July 1 to August 31.

To minimize the amount of riprap excavation necessary, the contractor will build the work bridge from the south bank of the river. No work bridge will be built from the north bank to bent 4. This will avoid disturbance to the area beside the north bank where the riprap is concentrated. In-water work bridge spans beside detour bridge bents 4 and 5 will have a 4.6 m spacing to support heavy construction equipment. Between bents 4 and 5 there will be three work bridge spans of 8.2 m, 11.9 m, and 8.2 m. These increased span lengths will allow a 11.2 m navigation channel and will reduce hydraulic disruption in the main channel of the river.

The new work bridge proposal would require 39 piles in water and another 29 piles below OHW but outside of the wetted channel.

2. ENDANGERED SPECIES ACT

2.1 Biological Opinion

2.1.1 Biological Information

The action area is defined by NOAA Fisheries regulations (50 CFR 402) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The action area is the Willamette and McKenzie Rivers beside the work area and downstream to the limit of visible turbidity.

Essential habitat features for salmonids are: Substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food (juvenile only), riparian vegetation, space, and safe passage conditions. The proposed action may affect the essential habitat features of water quality, riparian vegetation and substrate. The Willamette River within the action area serves as a migration and rearing area for UWR Chinook salmon. The McKenzie River within the action area serves as a migration, rearing and spawing area for UWR Chinook salmon

2.1.2 Evaluating Proposed Actions

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR Part 402. NOAA Fisheries must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify critical habitat. This analysis involves the initial steps of: (1) Defining the biological requirements and current status of the listed species; and (2) evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, NOAA Fisheries evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NOAA Fisheries must consider the estimated level of mortality attributable to: (1) Collective effects of the proposed or continuing action; (2) the environmental baseline; and (3) any cumulative effects. If NOAA Fisheries finds that the action is likely to jeopardize the listed species, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

For the proposed action, NOAA Fisheries' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NOAA Fisheries' analysis considers the extent to which the proposed action impairs the function of essential elements necessary for migration, spawning, and rearing of UWR Chinook salmon under the existing environmental baseline.

2.1.2.1 Biological Requirements

The first step in the methods NOAA Fisheries uses for applying the ESA section 7(a)(2) to listed salmonids is to define the species' biological requirements that are most relevant to each consultation. NOAA Fisheries also considers the current status of the listed species, taking into account population size, trends, distribution and genetic diversity. To assess the current status of the listed species, NOAA Fisheries starts with the determinations made in its decision to list the species for ESA protection and also considers new data available that is relevant to the determination.

The relevant biological requirements are those necessary for the listed species to survive and recover to a naturally-reproducing population level, at which time protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stock, enhance its capacity to adapt to various environmental conditions, and allow it to become self-sustaining in the natural environment.

For this consultation, the biological requirements are improved habitat characteristics that function to support successful rearing and migration. The current status of the listed species, based on their risk of extinction, has not significantly improved since the species were listed.

2.1.2.2 Environmental Baseline

Willamette River Watershed.
The Willamette River watershed covers a vast area (29,785 km^2) bordered on the east and west by the Cascades and the Pacific coast ranges. It drains from as far south as Cottage Grove and flows north to its confluence with the Columbia River. The Willamette River watershed is the largest river basin in Oregon. Elevations in the basin range from over 3,048 m in the Cascade Range to less than 3 m at the confluence with the Columbia River. It is home to most of the state's population, its largest cities, and many major industries. The watershed also contains some of Oregon's most productive agricultural lands and supports important fishery resources (City of Portland 2001).

The uplands (Coast and Cascade Ranges) receive about 80% of the precipitation falling on the Willamette River basin, and store much of this water as snow. Ecosystem productivity in these upland streams is relatively low, with aquatic insects gleaning much of their diet from material that falls into running water. In larger, slower tributaries, more plant material is produced in the stream itself. The mainstem supports a highly productive algal community that blooms as temperatures rise in the summer. Insects and some vertebrates feed on these plants, and many vertebrates, including salmonids, feed on stream-dwelling insects. Much of the habitat for Willamette River salmonids has been degraded by various land use practices or eliminated by dams. Wild salmonid populations have declined precipitously over the last century in the Willamette River (WRI 1999).

Significant changes have occurred in the watershed since the arrival of Europeans in the 1800s. The watershed was mostly forested land before the arrival of white settlers. Now, about half the basin is still forested. One-third of the basin is used for agriculture, and about 5% is urbanized or is in residential use. The river receives direct inputs from treated municipal wastes and industrial effluents. Nonpoint source input from agricultural, silvicultural, residential, urban and industrial land uses are also significant, especially during rainfall runoff.

The upper Willamette River, inclusive of the project site, is not listed on the Oregon Department of Environmental Quality (ODEQ) 303(d) List of Water Quality Limited Water Bodies, however, many of the tributaries are listed for various parameters including mercury, lead, E. coli, arsenic, dichloroethylenes, temperature, turbidity and dissolved oxygen (ODEQ 2002).

McKenzie River Watershed

The McKenzie River, a tributary of the Willamette River, drains an area of approximately 3,367 km^2, occupying 12% of the Willamette Basin (LCG 1996). Tracing the subbasin boundary in a clockwise direction, the watershed follows the Coburg Hills to the north and the crest of the Cascades to the east. The ridgeline separating the North Fork of the Middle Fork of the Willamette River Basin from the French Pete Basin and the South Fork McKenzie Basin forms the southern boundary. The confluence of the McKenzie River with the Willamette River shapes the western boundary, near the City of Coburg and just north of the City of Eugene (LCG 1996). Topography ranges from 3,157 m at the summit of South Sister in the Cascade Mountains down to 114 m near the mouth of the river (MRWC 2000).

The mainstem McKenzie River springs from the northeast portion of the watershed at Clear Lake (elevation 914 m) and flows southward for 24 km to Belknap Springs and then westward for 120 km to the Willamette River. Lost Creek, Horse Creek, South Fork McKenzie River, and Quartz Creek comprise the principal tributaries draining to the mainstem from the south (MRWC 2000). Smith River, Blue River, Gate Creek, Camp Creek and the Mohawk River are the principal tributaries joining from the north. In total, about 2,865 stream km comprise the McKenzie River subbasin hydrography (MRWC 2000).

The project action area is within the Lower McKenzie watershed, which is the western most area in the subbasin and drains approximately 477 km^2 or 14% of the total subbasin area. Diversions, water withdrawals, roads, changes in landscape vegetation, and the construction of eight dams (MRWC 2000) have altered the natural flow patterns of the McKenzie River. These dams are operated by either the Eugene Water and Electric Board (EWEB) or the ACOE and provide flood control, flow augmentation, navigation, and hydroelectric power. The mean annual flow of the McKenzie River is approximately 13 cms at the outlet of Clear Lake and 164 cms near the confluence with the Willamette River at Armitage State Park and near the project action area. River discharges peak in February with approximately 289 cms to 57 cms in September on the lower mainstem (LCG 1996). Summer discharges are roughly one-third higher than during pre-dam periods due to the releases of water from the Cougar and Blue River Reservoirs (LCG 1996).

Salmonid habitat quality in the McKenzie River subbasin has been reduced during the last century due to disturbances caused by urban development, logging practices, and the construction of dams and roads. These disturbances have fragmented habitat and simplified channel complexity thus reducing native fish populations and allowing non-native species to successfully compete (MRWC 2000). Water quality has also suffered. The section of the mainstem McKenzie River including the project action area is listed on the ODEQ List of Water Quality Limited Waterbodies for temperature during the summer months (ODEQ 2002).

Within the Lower McKenzie watershed and the project action area, a higher percentage of development than upriver has altered fish and wildlife habitat features. Development has caused the removal of riparian vegetation and riprapping of riverbanks. The mainstem and tributaries have been channelized, resulting in the loss of backwater and off channel rearing habitat. Industrial, agricultural, and urban stormwater runoff likely influences both the quantity and quality of water entering the McKenzie River (LCG 1996).

The McKenzie River, inclusive of the project site, is listed on the Oregon Department of Environmental Quality (DEQ) 303(d) List of Water Quality Limited Waterbodies (DEQ 2002). The McKenzie River is listed for temperature up to river mile 83.0.

2.1.3 Analysis of Effects

2.1.3.1 Effects of Original Proposed Action

Creeks and rivers are dynamic systems that naturally alter their courses in response to many physical processes. Roadways and other structures constructed along waterways are subject to flooding and undercutting as a result of these natural changes in the stream course. Structural hardening of embankments is the traditional means of protecting these structures along waterways. Hardened embankments simplify stream channels, alter hydraulic processes, and prevent natural channel adjustments (Spence *et al.* 1996). Moreover, embankment hardening may shift the erosion point either upstream or downstream from the project and accelerate stream velocity. As amplified erosive forces attack different locations and landowners respond with more bank hardening, the river eventually attains a continuous fixed alignment lacking habitat complexity (COE 1977).

Fish habitats are enhanced by diversity of habitats at the land-water interface and adjacent bank (COE 1977). Streamside vegetation provides shade that reduces water temperature and stabilizes streambanks. Overhanging branches provide cover from predators. Insects and other invertebrates that fall from overhanging branches may be preyed on by fish, or provide food sources for other prey organisms. Immersed vegetation, logs, and root wads provide points of attachment for aquatic prey organisms, shelter from swift currents during high flows, retain bed load sediment, create pools, and reduce flow velocity.

The combination of channel confinement within the existing bridge abutments and the legacy of large woody material removal within the system and specifically at roadway crossings has

simplified the habitat within the action area and retarded the formation and maintenance of complex fish habitat within the project reach.

Sediment

The driving of the temporary pile bridge piers may temporarily increase releases of sediment. Transportation of sediments into the Willamette River from upland construction activities is also possible. Upland excavation will expose and dislodge soils, increasing erosion and stream turbidity during rainfall. An increase in turbidity from suspension of fine sediments can adversely affect fish and filter-feeding macro-invertebrates downstream from the work site. At moderate levels, turbidity has the potential to reduce primary and secondary productivity; at higher levels, turbidity may interfere with feeding and may injure and even kill both juvenile and adult fish (Spence *et al.* 1996, Berg and Northcote 1985).

To minimize the potential for increased turbidity and disturbance of fish, most in-water work will occur during the preferred in-water work timing guideline. During this window, streamflows are typically low, fish presence is reduced, and rainfall is minimal. Erosion and sediment control devices will be deployed within 90 m of the stream and will stay in place until the project area is stabilized.

Chemical Contamination

As with all construction activities, accidental release of fuel, oil, and other contaminants may occur. Operation of the back-hoes, excavators, and other equipment requires the use of fuel, lubricants, *etc.*, which, if spilled into the channel of a waterbody or into the adjacent riparian zone, can injure or kill aquatic organisms. Petroleum-based contaminants, such as fuel, oil, and some hydraulic fluids, contain poly-cyclic aromatic hydrocarbons (PAHs), which can be acutely toxic to salmonids at high levels of exposure and can also cause chronic lethal and acute and chronic sublethal effects to aquatic organisms (Neff 1985). Similarly, exposure to herbicides can have lethal and sublethal effects on salmonids, aquatic invertebrates, aquatic vegetation, and target and non target riparian vegetation (Spence *et al.* 1996).

To minimize the potential for chemical contamination and disturbance of fish, most in-water work will occur during the preferred in-water work timing guideline of June 1 through October 31. During this window, streamflow is typically low, fish presence is reduced, and rainfall is minimal. In-water work area isolation will allow the work to occur in the dry, thereby reducing indirect (chemical contaminants) from entering the actively flowing water and direct impacts to fish. Staging areas will be in areas that have already been previously disturbed. Equipment and vehicle staging and storage will be at least 45 m from the regulated work area. Fuels and other hazardous materials will be at least 90 m away from the regulated work area.

Riparian Vegetation

Woody riparian vegetation provides large wood to the stream, which encourages the creation of rearing and spawning areas. Riparian vegetation also provides water quality functions (*e.g.* temperature control and nutrient transformation), bank stability, detritus (insect and leaf input,

small wood for substrate for insects, *etc.*), microclimate formation, floodplain sediment retention and vegetative filtering, and recharge of the stream hyporheic zone.

There will be some vegetation removal, but avoidance of vegetation will be an objective when gaining access or completing work near the river, streams or wetlands. Before any construction activities or significant earthwork, all clearing limits will be flagged for protection of critical riparian vegetation, wetlands and other sensitive sites that are nonessential to project construction and access.

Disturbed areas will be seeded and mulched with a permanent erosion control mix designed to promote shade-producing vegetation. It would consist of red fescue (*Festuca rubra*), blue wild rye (*Elymus glaucus*), and red alder (*Alnus rubra*) and native blue wild rye staw mulch. This seed mix has been shown to provide shade-producing riparian vegetation within a period of 4 to 6 years (N. Testa pers. comm. May 14, 2003).

Stream Hydraulics

The construction of the new temporary detour bridges over the Willamette River and McKenzie River channels will decrease hydraulic constriction and improve general ecological connectivity such as sediment transport and large woody debris transport within the Upper Willamette and McKenzie Rivers. The removal of the culvert at Judkins Road will open up the channel and decrease hydraulic constriction within the channel. The culvert installation at the Franklin Boulevard off-ramp will meet NOAA Fisheries fish passage criteria to minimize these effects.

Direct Harm or Harassment

Bridge bent construction and removal will likely require work area isolation from the flowing water. Fish removal activities would be in accordance with NOAA Fisheries fish handling guidelines (NOAA Fisheries 2000). Any listed fish removed from the isolated work areas would experience high stress with the possibility of up to a 5% delayed mortality rate depending on rescue method. Work area isolation can result in a loss of aquatic invertebrates due to dewatering areas within the wetted channel. In addition, sediment laden water created within isolated work areas could escape, resulting in impacts to the aquatic environment downstream from the project site.

Direct Harm Due to Steel Pile Driving

The project will require the installation of approximately 302 piles for support on the work bridges. These piles will be wood or hollow steel and will be installed via a vibratory hammer or an impact hammer. It is anticipated that the majority of the piles will be hollow steel and installed with an impact hammer.

Biological effects to UWR Chinook may result from the high sound pressures produced when driving piles with an impact hammer. Impact driving of steel piles can produce intense sound pressure waves that can injure and kill fishes (Stadler, pers. comm. 2003; Desjardin, pers. comm. 2003). The injuries caused by such pressure waves are known as barotraumas, and include hemorrhage and rupture of internal organs, including the swimbladder and kidneys in fish, and

damage to the auditory system. Death can be instantaneous, occur within minutes after exposure, or occur several days later. Fishes with swimbladders (which include salmonids) are sensitive to underwater impulsive sounds, such as sounds with a sharp sound pressure peak occurring in a short interval of time, because of swimbladder resonance, which is believed to occur in the frequency band of most sensitive hearing (usually 200 to 800 Hz) (Caltrans 2002). As the pressure wave passes through a fish, the swimbladder is rapidly squeezed due to the high pressure and then rapidly expanded as the underpressure component of the wave passes through the fish. The pneumatic pounding may result in the rupture of capillaries in the internal organs as indicated by observed blood in the abdominal cavity, and maceration of the kidney tissues (Caltrans 2002).

Another mechanism of injury and death is "rectified diffusion," which is the formation and growth of bubbles in tissue caused by regions of high sound pressure levels. Hastings (2002) expects little to no physical damage to aquatic animals for peak sound pressures below 190 dB (re: 1 Pascal), the threshold for rectified diffusion. However, much uncertainty exists as to the level of adverse effects to fish exposed to sound between 180 and 190 dB_{peak} due to species-specific variables. Based on this information, NOAA Fisheries has established the threshold for physical harm at 180 dB_{peak} for this project.

Sound pressure levels expressed as "root-mean-squared" (rms) values are commonly used in behavioral studies. Sound pressure levels in excess of 150 dB_{rms} are expected to cause temporary behavioral changes such as elicitation of a startle response or behavior associated with stress. These sound pressure levels are not expected to cause direct permanent injury, but, as discussed above, may decrease a fish's ability to avoid predators. Observations by Feist, *et al.* (1992) suggest that sound levels in this range may disrupt normal migratory behavior of juvenile salmon. They also noted that when exposed to the sounds from pile driving, juvenile pink and chum salmon were less likely to startle and flee when approached by an observer than were those that were shielded from the sounds. Based on this information, NOAA Fisheries has established the threshold for behavioral disruption at 150 dB_{rms} for this project.

Driving hollow steel piles of the size proposed for this project can produce sound pressure levels measured at 10m from the pile, over 180 dB_{peak} and 150 rms (Stadler 2003, pers. comm.). Clearly, these sound pressure levels are sufficiently high to present a lethal threat to fishes, as evidenced by the number of species, including salmonids, killed during impact driving of 24, 36-inch in diameter steel piles (Stadler, pers. obs. 2002; Desjardin, pers. comm. 2003). Vibratory hammers produce peak pressures that are approximately 17 dB lower than those from impact hammers (Nedwell and Edwards 2002) yielding an estimated peak sound pressure level of 193 dB for the piles used in this project. While this is above the threshold for physical injury (180 dB), no fish-kills have been linked to the use of vibratory hammers. The lack of evidence does not mean that vibratory hammers are harmless, but they are likely, less harmful than impact hammers.

The sounds from the two types of hammer differ not only in intensity, but also in frequency and impulse energy (the rate at which the pressure rises) as well. Most of the sound energy of impact

hammers is concentrated between 100 and 800 Hz, the frequencies thought to be most harmful to fishes, while the sound energy from the vibratory hammer is concentrated around 20 to 30 Hz.

Just as these two sounds are different, so are the behavioral responses of fishes to them. Most of the energy in the sounds produced by vibratory hammers is at the frequency of vibration, around 20 to 30 Hz, very near the range of infrasound (less than 20 Hz). The response to impact hammers is, however, quite different. Fishes may react to the first few strikes of an impact hammer with a "startle" response. After these initial strikes, the startle response wanes and the fishes may remain within the field of a potentially harmful sound (NOAA Fisheries 2001). Thus, impact hammers may be more harmful than vibratory hammers for two reasons: first they produce pressure waves with greater potential to harm fishes and second, the sounds produced do not elicit an avoidance response in fishes, which will expose them for longer periods to those harmful pressures.

Most reports of fish-kills associated with pile driving are limited to those fishes that were immediately killed and floated to the surface. However, physical harm to juvenile salmonids is not always expected to result in immediate, mortal injury – death may occur several hours or days later, while other injuries may be sublethal.

Small fishes that are subjected to high sound pressure levels may also be more vulnerable to predation, and the predators, themselves, may be drawn into the potentially harmful field of sound by following injured prey. The California Department of Transportation (cited in NOAA Fisheries 2003) reported that the stomach of a striped bass killed by pile driving contained several freshly consumed juvenile herring. It appears this striped bass was feeding heavily on killed, injured, or stunned herring as it, too, swam into the zone of lethal sound pressure. Due to their piscivorous nature, adult salmonids may be drawn to an area of dangerously high sound pressure level by the smaller fishes that are injured or killed.

Not all fishes killed by pile driving float to the surface. With few exceptions, fish-kills are reported only when dead and injured fishes are observed at the surface. Thus, the frequency and magnitude of such kills may be underestimated.

The effects to fishes of the high sound pressure levels produced by impact driving of steel piles depend on several factors, including the size and species of fish. At Bremerton, WA, approximately 100 surf perches (*Cymatogaster aggregata* and *Embiotoca lateralis*) were killed during impact driving of 30-inch diameter steel pilings (Stadler, pers. obs. 2003). The size of these fish ranged from 70-mm to 175-mm fork length. Dissections revealed that the swimbladders of the smallest of the fishes (80mm fork length) were completely destroyed, while those of the largest individual (170mm fork length) were nearly intact. Damage to the swimbladder of *C. aggregata* was more was more severe than to similar sized *E. lateralis*. These results indicate size and species-specific differences.

The potential for injury to fishes from pile driving depends on the type and intensity of the sounds produced. These are greatly influenced by a variety of factors, including the type of

hammer, the type of substrate and the depth of the water. Firmer substrates require more energy to drive piles into, and produce more intense sound pressures.

To minimize the potential risk to juvenile UWR Chinook and adults, the COE will need to implement a program of hydroacoustic monitoring of the underwater sound pressure levels for a subset of the piles during impact-driving, and implement sound attenuation measures if the following thresholds are exceeded. If the sound pressure levels exceed 150 dB_{rms} for more than 50% of the impacts, or ever exceed 180 dB_{peak}, a bubble curtain system will need to be deployed. Hydroacoustic monitoring will not be required if bubble curtain systems are automatically deployed during pile driving. The efficacy of a bubble curtain is dependent on the current regime where they are used. Currents above 1.6 kts can disperse the bubbles downstream, away from the pile. Stream currents are likely to be below the 1.6 kts, however, if they are above that threshold a confined bubble curtain will be used. Deployment of a bubble curtain is expected to attenuate the peak sound pressure levels by approximately 20 dB (a 90% reduction in sound energy). However, a bubble curtain may not bring the peak and rms sound pressure levels below the established thresholds, and some low level of take may still occur.

Any fish in the area that are not buffered by the sound attenuation devices will be affected. The expected low numbers of the smallest, UWR Chinook, based on discussions with ODFW, at the time of pile driving and the assumption that larger juvenile and adult UWR Chinook are less affected by the behavioral changes brought by pile driving, leads NOAA Fisheries to believe that this activity will have negligible adverse effects to listed salmonids with sound attenuation devices in place.

2.1.3.2 Effects of New Proposed Action

The effects of the revised action are covered in section 2.1.2.1 of this Opinion, however the magnitude of these effects are much greater than originally consulted on. Removal of the riprap in the channel will increase the potential for sediment in the McKenzie River. Some of the riprap that needs to be removed is embedded in a mixture of cobbles, gravels and sands. This disturbance will cause turbidity within the work area resulting in the effects discussed in section 2.1.2.1 of this Opinion. Hydraulically, removal of this riprap could have beneficial effects associated with increased channel depth, fish passage, and potentially deposition of spawning gravel. Direct harm with work area isolation and fish removal is covered in section 2.1.2.1 of this Opinion and is occurring at a greater scale due to the larger size of the work area isolation area.

The following conservation measures will be in place to minimize the effects of the riprap removal from the channel.

- Riprap removal will occur within an area isolated from the rest of the river and would minimize suspended sediment from migrating out of the work area and downstream.

- Fish will be removed from the isolated area to minimize exposure to the impacts of in-water work and also prevent fish from moving into the work area.

- Riprap will be completely removed from the work site and stored in an upland location. After the piles are driven and the drilled shafts completed, some riprap will be replaced in the river as needed to stabilize and protect the existing bridge bents. This will provide a net reduction of riprap material in the channel.

- All riprap excavation, replacement, and in-water work area isolation will be completed within the standard ODFW-recommended in-water work window of July 1 to August 31.

2.1.2.3 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation". Other activities within the watershed have the potential to impact fish and habitat within the action area. A wide variety of actions including ranching, irrigation, and timber harvest occur within the Columbia River basin. Non-federal activities within the watershed are expected to increase. Thus, NOAA Fisheries assumes that future private and state actions will continue within the watershed, but at increasingly higher levels as population density climbs.

2.1.4 Conclusion

NOAA Fisheries has determined that, based on the available information, the revised action is not likely to jeopardize the continued existence of UWR Chinook salmon. NOAA Fisheries used the best available scientific and commercial data to analyze the effects of the proposed action on the biological requirements of the species relative to the environmental baseline, together with cumulative effects. NOAA Fisheries applied its evaluation methodology (NOAA Fisheries 1996) to the proposed action and found that it could cause slight degradation of anadromous salmonid habitat due to increases in sedimentation and turbidity. Furthermore, NOAA Fisheries expects that construction related and H-pile installation effects could alter normal feeding and sheltering behavior of juvenile UWR Chinook salmon should any be present in the action area during the proposed action. These effects will be temporary.

Our conclusions are based on the following considerations: (1) Most of the proposed work will occur during the in-water work window of June 1 through October 31 (Willamette River) and July 1 through August 31 (McKenzie River), which NOAA Fisheries expects will minimize the likelihood of UWR Chinook salmon presence in the action area due to low flow and warm water conditions; (2) any increases in sedimentation and turbidity to the reaches of the Willamette and McKenzie Rivers will be short-term and minor in scale, and will not change or worsen existing conditions for stream substrate in the action area; (3) all work will be done in one season and no temporary work structures will remain over winter; (4) ODOT will implement conservation measures that will minimize construction impacts due to construction on the site; and (5) the

proposed action is not likely to impair properly functioning habitat, appreciably reduce the functioning of already impaired habitat, or retard the long-term progress of impaired habitat toward proper functioning condition essential to the long-term survival and recovery at the population or ESU scale.

2.1.5 Conservation Recommendations

Conservation recommendations are defined as "discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information" (50 CFR 402.02). Section 7 (a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. NOAA Fisheries has no additional conservation recommendations regarding the action addressed in this Opinion.

2.1.6 Reinitiation of Consultation

Consultation must be reinitiated if: (1) The amount or extent of taking specified in the incidental take statement is exceeded, or is expected to be exceeded; (2) new information reveals that effects of the action may affect listed species in a way not previously considered; (3) the action is modified in a way that causes an effect on listed species that was not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16).

2.2 Incidental Take Statement

The ESA at section 9 [16 USC 1538] prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonids by section 4(d) rule [50 CFR 223.203]. Take is defined by the statute as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." [16 USC 1532(19)] Harm is defined by regulation as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavior patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering." [50 CFR 222.102] Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering." [50 CFR 17.3] Incidental take is defined as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant." [50 CFR 402.02] The ESA at section 7(o)(2) removes the prohibition from any incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement [16 USC 1536].

An incidental take statement specifies the impact of any incidental taking of threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets

forth terms and conditions with which the action agency must comply to implement the reasonable and prudent measures.

2.2.1 Amount and Extent of the Take in the Original Proposed Action

NOAA Fisheries anticipates that the action covered by this Opinion is reasonably certain to result in incidental take of UWR Chinook salmon because of detrimental effects from increased sediment levels (non-lethal), the potential for direct incidental take during the work area isolation, and delayed mortality due to handling during the fish removal process. Effects of actions such as the increased sediment levels are largely unquantifiable in the short term, and are not expected to be measurable as long-term harm to habitat features or by long-term harm to UWR Chinook salmon behavior or population levels. There is also potential for take due to effects associated with driving steel piles with an impact hammer. Sound attenuation devices will minimize this take, however, some low-level take could still occur. Therefore, even though NOAA Fisheries expects some low-level incidental take to occur due to the actions covered by this Opinion, the best scientific and commercial data available are not sufficient to enable NOAA Fisheries to estimate a specific amount of incidental take to the species itself. In instances such as these, the NOAA Fisheries designates the expected level of take as "unquantifiable." Based on the information in the BA, NOAA Fisheries anticipates that an unquantifiable amount of incidental take is reasonably certain to occur as a result of the actions covered by this Opinion.

In addition, NOAA Fisheries expects that the possibility exists for handling UWR Chinook salmon during the work isolation process, which will result in incidental take to individuals during the construction period. NOAA Fisheries anticipates that incidental take of up to 103 juvenile UWR Chinook salmon (98 non-lethal and 5 lethal) could occur as a result of the fish removal process on the Willamette River detour bridge and work bridge. NOAA Fisheries anticipates that incidental take of up to 80 juvenile UWR Chinook salmon (76 non-lethal and 4 lethal) could occur as a result of the fish removal process on the McKenzie River detour bridge. These estimates are based on approximately 250 m^2 of stream habitat that will be dewatered during work area isolation on the Willamette River and 40 m^2 on the McKenzie River. The extent of the take is limited to UWR Chinook salmon within the action area. The extent of the take includes the streambed, streambank and riparian corridor of the Willamette River and the McKenzie River, extending to the upstream project disturbance limits and downstream 30 m below the project disturbance limits.

2.2.2 Amount and Extent of the Take in the New Proposed Action

NOAA Fisheries anticipates that the action covered by this Opinion is reasonably certain to result in incidental take of UWR Chinook salmon because of detrimental effects from increased sediment levels (non-lethal), the potential for direct incidental take during the work area isolation, and delayed mortality due to handling during the fish removal process. Effects of actions such as the increased sediment levels are largely unquantifiable in the short term, and are not expected to be measurable as long-term harm to habitat features or by long-term harm to

UWR Chinook salmon behavior or population levels. There is also potential for take due to effects associated with driving steel piles with an impact hammer. Sound attenuation devices will minimize this take, however, some low-level take could still occur. Therefore, even though NOAA Fisheries expects some low-level incidental take to occur due to the actions covered by this Opinion, the best scientific and commercial data available are not sufficient to enable NOAA Fisheries to estimate a specific amount of incidental take to the species itself. In instances such as these, the NOAA Fisheries designates the expected level of take as "unquantifiable." Based on the information in the BA, NOAA Fisheries anticipates that an unquantifiable amount of incidental take is reasonably certain to occur as a result of the actions covered by this Opinion.

In addition, NOAA Fisheries expects that the possibility exists for handling UWR Chinook salmon during the work isolation process, which will result in incidental take to individuals during the construction period. NOAA Fisheries anticipates that incidental take of up to 103 juvenile UWR Chinook salmon (98 non-lethal and 5 lethal) could occur as a result of the fish removal process on the Willamette River detour bridge and work bridge. NOAA Fisheries anticipates that incidental take of up to 320 juvenile UWR Chinook salmon (304 non-lethal and 16 lethal) could occur as a result of the fish removal process on the McKenzie River detour bridge. These estimates are based on approximately 250 m^2 of stream habitat that will be dewatered during work area isolation on the Willamette River and 940 m^2 on the McKenzie River. The extent of the take is limited to UWR Chinook salmon within the action area. The extent of the take includes the streambed, streambank and riparian corridor of the Willamette River and the McKenzie River, extending to the upstream project disturbance limits and downstream 30 m below the project disturbance limits.

2.2.3 Reasonable and Prudent Measures

The measures described below are non-discretionary. They must be implemented so that they become binding conditions in order for the exemption in section 7(a)(2) to apply. The COE has the continuing duty to regulate the activities covered in this incidental take statement. If the COE fails to require the contractor to adhere to the terms and conditions of the incidental take statement through enforceable terms added to the document authorizing this action, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(a)(2) may lapse.

NOAA Fisheries believes that the following reasonable and prudent measures are necessary and appropriate to minimize take of the above species. The COE shall:

1. Minimize incidental take from general construction by excluding unauthorized permit actions and applying permit conditions that avoid or minimize adverse effects to riparian and aquatic systems.

2. Minimize the likelihood of incidental take caused by impact-driving of steel piles.

3. Ensure completion of a comprehensive monitoring and reporting program to confirm this Opinion is meeting its objective of minimizing take from permitted activities

2.2.4 Amended Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, COE must comply with the following terms and conditions, which implement the reasonable and prudent measures described above for each category of activity. Amendments to the terms and conditions due to the new proposed action or any approved in-water work extensions are highlighted in the following terms and conditions.

1. To implement reasonable and prudent measure #1 (general conditions for construction, operation and maintenance), the Corps shall ensure that:

    a. Timing of in-water work. Work within the active channel will be completed during the period of July 1 to October 31 except as noted below. All work must be completed by this date unless otherwise approved in writing by NOAA Fisheries. Work can proceed outside of the in-water work period if it is fully contained and isolated from the river. For the purposes of this consultation, containment areas for bent construction can be done through December on the Willamette River and through September on the McKenzie River.
    b. Minimum Area. Confine construction impacts to the minimum area necessary to complete the project.
    c. Cessation of work. Project operations will cease under high flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage.
    d. Fish screens. All water intakes used for a project, including pumps used to isolate an in-water work area, will have a fish screen installed, operated and maintained according to NOAA Fisheries' fish screen criteria.[1]
    e. Fish passage. Passage will be provided for any adult or juvenile salmonid species present in the project area during construction, and after construction for the life of the project. Upstream passage is not required during construction if it did not previously exist.
    f. Pollution and Erosion Control Plan. A pollution and erosion control plan will be prepared and carried out to prevent pollution related to construction operations. The plan must be available for inspection on request by Corps or NOAA Fisheries.

[1] National Marine Fisheries Service, *Juvenile Fish Screen Criteria* (revised February 16, 1995) and *Addendum: Juvenile Fish Screen Criteria for Pump Intakes* (May 9, 1996) (guidelines and criteria for migrant fish passage facilities, and new pump intakes and existing inadequate pump intake screens) (http://www.nwr.noaa.gov/1hydrop/hydroweb/ferc.htm).

i. Plan Contents. The pollution and erosion control plan must contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations.

(1) Practices to prevent erosion and sedimentation associated with access roads, stream crossings, construction sites, borrow pit operations, haul roads, equipment and material storage sites, fueling operations and staging areas.

(2) Practices to confine, remove and dispose of excess concrete, cement and other mortars or bonding agents, including measures for washout facilities.

(3) A description of any hazardous products or materials that will be used for the project, including procedures for inventory, storage, handling, and monitoring.

(4) A spill containment and control plan with notification procedures, specific clean up and disposal instructions for different products, quick response containment and clean up measures that will be available on the site, proposed methods for disposal of spilled materials, and employee training for spill containment.

(5) Practices to prevent construction debris from dropping into any stream or waterbody, and to remove any material that does drop with a minimum disturbance to the streambed and water quality.

ii. Inspection of erosion controls. During construction, all erosion controls must be inspected daily during the rainy season and weekly during the dry season to ensure they are working adequately.[2]

(1) If inspection shows that the erosion controls are ineffective, work crews must be mobilized immediately to make repairs, install replacements, or install additional controls as necessary.

(2) Sediment must be removed from erosion controls once it has reached 1/3 of the exposed height of the control.

g. Construction discharge water. All discharge water created by construction (*e.g.*, concrete washout, pumping for work area isolation, vehicle wash water) will be treated as follows:

i. Water quality. Facilities must be designed, built and maintained to collect and treat all construction discharge water using the best available technology applicable to site conditions. The treatment must remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants likely to be present.

ii. Discharge velocity. If construction discharge water is released using an outfall or diffuser port, velocities must not exceed 4 feet per second.

[2] "Working adequately" means no turbidity plumes are evident during any part of the year.

iii. Spawning areas, marine submerged vegetation. No construction discharge water may be released within 300 feet upstream of active spawning areas or areas with marine submerged vegetation.

h. Preconstruction activity. Before significant[3] alteration of the project area, the following actions must be completed:

i. Marking. Flag the boundaries of clearing limits associated with site access and construction to prevent ground disturbance of critical riparian vegetation, wetlands and other sensitive sites beyond the flagged boundary.

ii. Emergency erosion controls. Ensure that the following materials for emergency erosion control are onsite.

(1) A supply of sediment control materials (*e.g.*, silt fence, straw bales[4]).

(2) An oil-absorbing, floating boom whenever surface water is present.

iii. Temporary erosion controls. All temporary erosion controls must be in-place and appropriately installed downslope of project activity within the riparian area until site restoration is complete.

i. Temporary access roads.

i. Existing ways. Existing roadways or travel paths must be used whenever possible, unless construction of a new way would result in less habitat take.

ii. Steep slopes. Temporary roads built mid-slope or on slopes steeper than 30% are not authorized.

iii. Minimizing soil disturbance and compaction. When a new temporary road is necessary within 150 feet[5] of a stream, waterbody or wetland, soil disturbance and compaction must be minimized by clearing vegetation to ground level and placing clean gravel over geotextile fabric, unless otherwise approved in writing by NOAA Fisheries.

iv. Temporary stream crossings.

(1) The number of temporary stream crossings must be minimized.

(2) Temporary road crossings must be designed as follows:

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[3] "Significant" means an effect can be meaningfully measured, detected or evaluated.

[4] When available, certified weed-free straw or hay bales must be used to prevent introduction of noxious weeds.

[5] Distances from a stream or waterbody are measured horizontally from, and perpendicular to, the bankfull elevation, the edge of the channel migration zone, or the edge of any associated wetland, whichever is greater. "Channel migration zone" means the area defined by the lateral extent of likely movement along a stream reach as shown by evidence of active stream channel movement over the past 100 years, e.g., alluvial fans or floodplains formed where the channel gradient decreases, the valley abruptly widens, or at the confluence of larger streams.

(a) A survey must identify and map any potential spawning habitat within 300 feet downstream from a proposed crossing.

(b) No stream crossing may occur at known or suspected spawning areas, or within 300 feet upstream of such areas if spawning areas may be affected.

(c) The crossing design must provide for foreseeable risks (*e.g.*, flooding and associated bedload and debris) to prevent the diversion of streamflow out of the channel and down the road if the crossing fails.

(d) Vehicles and machinery must cross riparian areas and streams at right angles to the main channel wherever possible.

v. Obliteration. When the project is completed, all temporary access roads and work bridges must be obliterated, the soil must be stabilized, and the site must be revegetated. Temporary roads in wet or flooded areas must be abandoned and restored as necessary by the end of the in-water work period.

j. Heavy Equipment. Use of heavy equipment will be restricted as follows:

i. Choice of equipment. When heavy equipment must be used, the equipment selected must have the least adverse effects on the environment (*e.g.*, minimally-sized, rubber-tired).

ii. Vehicle staging. Vehicles must be fueled, operated, maintained and stored as follows:

(1) Vehicle staging, cleaning, maintenance, refueling, and fuel storage must take place in a vehicle staging area placed 150 feet or more from any stream, waterbody or wetland.

(2) All vehicles operated within 150 feet of any stream, waterbody or wetland must be inspected daily for fluid leaks before leaving the vehicle staging area. Any leaks detected must be repaired in the vehicle staging area before the vehicle resumes operation. Inspections must be documented in a record that is available for review on request by COE or NOAA Fisheries.

(3) All equipment operated instream must be cleaned before beginning operations below the bankfull elevation to remove all external oil, grease, dirt, and mud.

iii. Stationary power equipment. Stationary power equipment (*e.g.*, generators, cranes) operated within 150 feet of any stream, waterbody or wetland must be diapered to prevent leaks, unless otherwise approved in writing by NOAA Fisheries.

k. Site preparation. Native materials will be conserved for site restoration.

i. If possible, native materials must be left where they are found.

ii. Materials that are moved, damaged or destroyed must be replaced with a functional equivalent during site restoration.

iii. Any large wood[6], native vegetation, weed-free topsoil, and native channel material displaced by construction must be stockpiled for use during site restoration.

l. Isolation of in-water work area. If adult or juvenile fish are reasonably certain to be present, the work area will be well isolated from the active flowing stream using inflatable bags, sandbags, sheet pilings, or similar materials. The work area will also be isolated if in-water work may occur within 300 feet upstream of spawning habitats. **In the McKenzie River, efforts should be made to seine or crowd adults and juveniles out of the area before complete isolation and electrofishing efforts.**

m. Capture and release. Before and intermittently during pumping to isolate an in-water work area, an attempt must be made to capture and release fish from the isolated area using trapping, seining, electrofishing, or other methods as are prudent to minimize risk of injury.

i. A fishery biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish must conduct or supervise the entire capture and release operation.

ii. If electrofishing equipment is used to capture fish, the capture team must comply with NOAA Fisheries' electrofishing guidelines.[7]

iii. The capture team must handle ESA-listed fish with extreme care, keeping fish in water to the maximum extent possible during seining and transfer procedures to prevent the added stress of out-of-water handling.

iv. Captured fish must be released as near as possible to capture sites. **Due to the potentially high number of fish that may be salvaged, the applicant should survey and locate multiple release sites that have adequate water quality and habitat features associated with them.**

v. ESA-listed fish may not be transferred to anyone except NOAA Fisheries personnel, unless otherwise approved in writing by NOAA Fisheries.

vi. Other Federal, state, and local permits necessary to conduct the capture and release activity must be obtained.

vii. NOAA Fisheries or its designated representative must be allowed to accompany the capture team during the capture and release activity, and must be allowed to inspect the team's capture and release records and facilities.

n. Earthwork. Earthwork (including drilling, excavation, dredging, filling and compacting) will be completed as quickly as possible.

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[6] For purposes of this Opinion only, "large wood" means a tree, log, or rootwad big enough to dissipate stream energy associated with high flows, capture bedload, stabilize streambanks, influence channel characteristics, and otherwise support aquatic habitat function, given the slope and bankfull width of the stream in which the wood occurs. See, Oregon Department of Forestry and Oregon Department of Fish and Wildlife, *A Guide to Placing Large Wood in Streams*, May 1995 (www.odf.state.or.us/FP/RefLibrary/LargeWoodPlacemntGuide5-95.doc).

[7] National Marine Fisheries Service, *Backpack Electrofishing Guidelines* (December 1998) (http://www.nwr.noaa.gov/1salmon/salmesa/pubs/electrog.pdf).

i. Site stabilization. All disturbed areas must be stabilized, including obliteration of temporary roads, within 12 hours of any break in work unless construction will resume work within 7 days between June 1 and September 30, or within 2 days between October 1 and May 31.

ii. Source of materials. Boulders, rock, woody materials and other natural construction materials used for the project must be obtained outside the riparian area.

o. Site restoration. All streambanks, soils and vegetation disturbed by the project are cleaned up and restored as follows:

i. Restoration goal. The goal of site restoration is renewal of habitat access, water quality, production of habitat elements (such as large woody debris), channel conditions, flows, watershed conditions and other ecosystem processes that form and maintain productive fish habitats.

ii. Streambank shaping. Damaged streambanks must be restored to a natural slope, pattern and profile suitable for establishment of permanent woody vegetation.

iii. Revegetation. Areas requiring revegetation must be replanted before the first April 15 following construction with a diverse assemblage of species that are native to the project area or region, including grasses, forbs, shrubs and trees.

iv. Pesticides. No pesticide application is allowed, although mechanical or other methods may be used to control weeds and unwanted vegetation.

v. Fertilizer. No surface application of fertilizer may occur within 50-feet of any stream channel.

vi. Fencing. Fencing must be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.

p. Treated wood.

i. Projects using treated wood[8] that may contact flowing water or that will be placed over water where it will be exposed to mechanical abrasion or where leachate may enter flowing water are not authorized, except for pilings installed following NOAA Fisheries' guidelines.[9] Treated wood pilings must incorporate design features to minimize abrasion of the treated wood from vessels, floats or other objects that may cause abrasion of the piling.

ii. Projects that require removal of treated wood will use the following precautions.

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[8] 'Treated wood' means lumber, pilings, and other wood products preserved with alkaline copper quaternary (ACQ), ammoniacal copper arsenate (ACA), ammoniacal copper zinc arsenate (ACZA), copper naphthenate, chromated copper arsenate (CCA), pentachlorophenol, or creosote.

[9] Letter from Steve Morris, National Marine Fisheries Service, to W.B. Paynter, Portland District, U.S. Army Corps of Engineers (December 9, 1998) (transmitting a document titled *Position Document for the Use of Treated Wood in Areas within Oregon Occupied by Endangered Species Act Proposed and Listed Anadromous Fish Species, National Marine Fisheries Service, December 1998*).

a. Treated wood debris. Take care to ensure that no treated wood debris falls into the water. If treated wood debris does fall into the water, remove it immediately.

b. Disposal of treated wood debris. Dispose of all treated wood debris removed during a project, including treated wood pilings, at an upland facility approved for hazardous materials of this classification. Do not leave a treated wood piling in the water or stacked on the streambank.

q. Permanent stream crossings. Permanent stream crossings will be built as follows.

a. Design.

(1) Crossing types.[10] Design road crossings in the following priority.

a. Nothing – road realignment to avoid crossing the stream.

b. Bridge – spanning the stream to allow for long-term dynamic channel stability.

c. Streambed simulation – bottomless arch, embedded culvert, or ford.

d. No-slope design culvert[11] – sometimes referred to as hydraulic design, here limited to 0% slopes.

(2) If the crossing will occur near an active spawning area, only full span bridges or streambed simulation may be used.

(3) Fill width must be limited to the minimum necessary to complete the crossing, and must not reduce existing stream width.

r. Removal and Placement of Instream Riprap. (McKenzie River work bridge only) Removal and placement of the riprap within the channel will be conducted as follows.

i. Riprap removal and replacement will be completed from the constructed portion of the work bridge.

ii. Riprap removal will be completed with the least impact possible to natural streambed materials.

iii. Riprap placement shall be the minimum necessary to provide support to the existing I-5 bridge bents in the McKenzie River.

2. To implement reasonable and prudent measure #2, (steel pile driving) the COE shall ensure that:

a. The number and diameter of the pilings are minimized, as appropriate, without reducing the structural integrity.

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[10] For a discussion of crossing design types, see, National Marine Fisheries Service, Southwest Region, *Guidelines for Salmonid Passage at Stream Crossings* (September 2001) (http://swr.nmfs.noaa.gov/hcd/NMFSSCG.PDF) and Washington Department fo Fish and Wildlife, *Fish Passage Design at Road Culverts: A Design Manual for Fish Passage at Road Crossings* (March 3, 1999) (http://www.wa.gov/wdfw/hab/engineer/cm/toc.htm).

[11] "No-slope design culvert" means a culvert that is sufficiently large and installed flat to allow the natural movement of bedload to form a stable bed inside the culvert.

b. The COE shall ensure that, providing substrate conditions are appropriate, vibratory hammers are used to drive piles when possible. If substrate conditions are not appropriate, impact hammers may be used. Impact hammers will require hydroacoustic monitoring and use of a bubble curtain if the pressure thresholds are exceeded, as described above, or the use of a bubble curtain without monitoring.

c. Drive each piling as follows to minimize the use of force and resulting sound pressure.
   i. When impact drivers will be used to install a pile, use the smallest driver and the minimum force necessary to complete the job. Use a drop hammer or a hydraulic impact hammer, whenever feasible and set the drop height to the minimum necessary to drive the piling.
   ii. When using an impact hammer to drive or proof steel piles, one of the following sound attenuation devices will be used to reduce sound pressure levels by 20 decibels.
   iii. Place a block of wood or other sound dampening material between the hammer and the piling being driven.
   iv. If currents are 1.7 miles per hour or less, surround the piling being driven by an unconfined bubble curtain that will distribute small air bubbles around 100% of the piling perimeter for the full depth of the water column.[12]
   v. If currents greater than 1.7 miles per hour, surround the piling being driven by a confined bubble curtain (*e.g.*, a bubble ring surrounded by a fabric or metal sleeve) that will distribute air bubbles around 100% of the piling perimeter for the full depth of the water column.
   vi. Other sound attenuation devices as approved in writing by NOAA Fisheries.

d. Piling removal. If a temporary or permanent piling will be removed, the following conditions apply:
   i. Dislodge the piling with a vibratory hammer.
   ii. Once loose, place the piling onto the construction barge or other appropriate dry storage site.
   iii. If a treated wood piling breaks during removal, either remove the stump by breaking or cutting 3 feet below the sediment surface or push the stump in to that depth, then cover it with a cap of clean substrate appropriate for the site.

[12] For guidance on how to deploy an effective, economical bubble curtain, see, Longmuir, C. and T. Lively, *Bubble Curtain Systems for Use During Marine Pile Driving*, Fraser River Pile and Dredge LTD, 1830 River Drive, New Westminster, British Columbia, V3M 2A8, Canada. Recommended components include a high volume air compressor that can supply more than 100 pounds per square inch at 150 cubic feet per minute to a distribution manifold with 1/16 inch diameter air release holes spaced every 3/4 inch along its length. An additional distribution manifold is needed for each 35 feet of water depth.

iv. Fill the holes left by each piling with clean, native sediments, whenever feasible.

3. To implement reasonable and prudent measure #3 (monitoring), the COE shall:

a. Implementation monitoring. Ensure that the permittee submits a monitoring report to the COE within 120 days of project completion describing the permittee's success meeting permit conditions. The monitoring report will include the following information:
   i. Project identification
      (1) Permittee name, permit number, and project name.
      (2) Project location, including any compensatory mitigation site(s), by 5th field HUC and by latitude and longitude as determined from the appropriate USGS 7-minute quadrangle map.
      (3) Corps contact person.
      (4) Starting and ending dates for work completed.

b. Photo documentation. Photo of habitat conditions at the project and any compensation site(s), before, during, and after project completion.[13]
   i. Include general views and close-ups showing details of the project and project area, including pre and post construction.
   ii. Label each photo with date, time, project name, photographer's name, and a comment about the subject.

c. Other data. Additional project-specific data, as appropriate for individual projects.
   i. Work cessation. Dates work cessation was required due to high flows.
   ii. Fish screen. Compliance with NOAA Fisheries' fish screen criteria.
   iii. A summary of pollution and erosion control inspections, including any erosion control failure, hazardous material spill, and correction effort.
   iv. Site preparation.
      (1) Total cleared area – riparian and upland.
      (2) Total new impervious area.
   v. Isolation of in-water work area, capture and release.
      (1) Supervisory fish biologist – name and address.
      (2) Methods of work area isolation and take minimization.
      (3) Stream conditions before, during and within one week after completion of work area isolation.
      (4) Means of fish capture.
      (5) Number of fish captured by species.
      (6) Location and condition of all fish released.
      (7) Any incidence of observed injury or mortality.

[13] Relevant habitat conditions may include characteristics of channels, eroding and stable streambanks in the project area, riparian vegetation, water quality, flows at base, bankfull and over-bankfull stages, and other visually discernable environmental conditions at the project area, and upstream and downstream from the project.

vi. Site restoration.
(1) Finished grade slopes and elevations.
(2) Log and rock structure elevations, orientation, and anchoring (if any).
(3) Planting composition and density.
(4) A five-year plan to:
(a) Inspect and, if necessary, replace failed plantings to achieve 100% survival at the end of the first year, and 80% survival or 80% coverage after 5 years (including both plantings and natural recruitment).
(b) Control invasive non-native vegetation.
(c) Protect plantings from wildlife damage and other harm.

v. Monitoring reports will be submitted to:

NOAA Fisheries
Oregon Habitat Branch
Attn: **2004/00669**
525 NE Oregon Street, Suite 500
Portland, OR 97232-2778

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Background

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance essential fish habitat (EFH) for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2)).

- NOAA Fisheries must provide conservation recommendations for any Federal or state action that would adversely affect EFH (§305(b)(4)(A)).

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

EFH consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

3.2 Identification of EFH

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for federally-managed fisheries within the waters of Washington, Oregon, and California. Designated EFH for groundfish and coastal pelagic species encompasses all waters from the mean high water line, and upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon and California, seaward to the boundary of the U.S. exclusive economic zone (370.4 km) (PFMC 1998a, 1998b). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other waterbodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable artificial barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years) (PFMC 1999). In estuarine and marine areas, designated salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (370.4 km) offshore of Washington, Oregon, and California north of Point Conception to the Canadian border (PFMC 1999).

Detailed descriptions and identifications of EFH are contained in the fishery management plans for groundfish (PFMC 1998a), coastal pelagic species (PFMC 1998b), and Pacific salmon (PFMC 1999). Casillas *et al.* (1998) provides additional detail on the groundfish EFH habitat complexes. Assessment of the potential adverse effects to these species' EFH from the proposed action is based, in part, on these descriptions and on information provided by the Corps.

3.3 Proposed Action

The proposed action is detailed above in section 1.2 of this document. For the purposes of this EFH consultation, the action area is defined as the streambed, streambank and riparian corridor of the Willamette River and the McKenzie River, extending to the upstream project disturbance limits and downstream one mile below the project disturbance limits. This area has been designated as EFH for various life stages of Chinook salmon and coho salmon.

3.4 Effects of Proposed Action

As described in detail in section 2.1.3 of this document, the proposed activities may result in short-term adverse effects to water quality (sediment, chemical contamination, riparian vegetation removal). NOAA Fisheries expects short-term adverse effects from increases in turbidity and the potential for chemical contamination within the action area. NOAA Fisheries expects long-term beneficial effects from decreased constriction and improved hydraulic conditions of the Willamette and McKenzie Rivers channel as a result of the proposed bridge replacement and riprap removal in the McKenzie River.

3.5 Conclusion

The proposed action will adversely affect the EFH for Chinook and coho salmon.

3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations for any Federal or state agency action that would adversely affect EFH. The conservation measures proposed for the project by the COE, all of the reasonable and prudent measures and the terms and conditions contained in sections 2.2.3 and 2.2.4, respectively, are applicable to salmon EFH. Therefore, NOAA Fisheries incorporates each of those measures here as EFH conservation recommendations.

3.7 Statutory Response Requirement

Please note that the MSA (section 305(b)) and 50 CFR 600.920(j) requires the Federal agency to provide a written response to NOAA Fisheries after receiving EFH conservation recommendations within 30 days of its receipt of this letter. This response must include a description of measures proposed by the agency to avoid, minimize, mitigate or offset the adverse impacts of the activity on EFH. If the response is inconsistent with a conservation recommendation from NOAA Fisheries, the agency must explain its reasons for not following the recommendation.

3.8 Supplemental Consultation

The COE must reinitiate EFH consultation with NOAA Fisheries if either action is substantially revised or new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920).

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